

THE SHARP-TAILED SPARROWS OF THE ATLANTIC COAST

BY WILLIAM MONTAGNA

DURING the month of June, 1939, while collecting birds in the vicinity of Popham Beach, Maine, I became especially interested in the Sharp-tailed Sparrow, *Ammospiza caudacuta*. A series of specimens indicated that this area was one of intergradation between the Acadian Sharp-tail, *A. c. subvirgata*, and the nominate race. In June, 1940, I collected Sharp-tails in New Jersey, and these birds, which should have been typical *A. c. caudacuta*, appeared to be dark-backed enough for *A. c. diversa*. Resolved to ascertain just where this last-named, southernmost race actually bred, I made trips to Delaware, Maryland, Virginia and North Carolina, in June and July, 1941. Accompanying me were Jim Fife (who also had been with me in New Jersey, in 1940) and H. Godwin Stevenson, Jr., who served as botanist. I want to express my appreciation to these men for helping me.

In the preparation of this paper I have received guidance from my friend George M. Sutton. The Museum of Comparative Zoology at Harvard University, Field Museum of Natural History, the U. S. National Museum, the Carnegie Museum, and the Museum of Natural History at the University of Minnesota have lent specimens for comparison. Louis B. Bishop, Ludlow Griscom, J. J. Murray, Arthur A. Norton, James L. Peters, Roger T. Peterson, Percy Taverner, Alexander Wetmore, and others have given me valuable information. To all the above-named men and institutions, I tender my thanks.

This paper deals primarily with the breeding distribution of these birds. I have divided the article into five sections on: breeding range, behavior of breeding birds, habitat, winter range, and relationship between Sharp-tailed Sparrows and Seaside Sparrows.

BREEDING RANGE

Ammospiza caudacuta subvirgata.—This is the northernmost race of Sharp-tails which breeds on the Atlantic Coast. Dwight (1896) referring to this bird says that it is "peculiar to the fresh and salt water marshes of the Maritime Provinces of Canada, especially those bordering on the Bay of Fundy and the Gulf of St. Lawrence." Taverner (1927) records a specimen of this race taken at Kamouraska, which is situated on the south shore of the St. Lawrence River, eighty miles below Quebec city. Young (1931) found some Sharp-tails nesting on Grindstone Island (Magdalen Islands); unfortunately, however, no specimens were taken and I am allowing for the possibility of an error until more definite proof is given. Mr. J. L. Peters tells me that there are two sets of eggs in the Museum of Comparative Zoology taken at Goss Island,

Magdalen Islands, by E. Arnold in 1922. Arnold took no birds, only eggs and nests. It is difficult to accept such records since the eggs of Sharp-tails are much like those of Savannah Sparrows. Mr. Peters is inclined to believe that the two nests collected by Arnold look more like those of the latter bird. Brewster (1876) reported five specimens taken at Tignish, Prince Edward Island. Dwight (1887) declared these specimens and other Prince Edward birds *subvirgata*. Dwight did not report them from Nova Scotia, although Lewis (1920) found them there ". . . common in suitable localities." In our Cornell University collection we have a splendid series of adults and nestlings collected in Nova Scotia by Victor Gould at Grand Pré, Wolfville and Malassam, in King's County, and Chebaque Point, Yarmouth County. All of the birds were taken in July, 1927. In New Brunswick they are locally common, especially along the banks of the rivers which empty into the Bay of Fundy. Dwight (1887) designated Hillsborough, New Brunswick as the type locality for *subvirgata*.

Ludlow Griscom, in a recent letter to me commenting on the nesting of this bird in Maine, says that the salt marshes in that state are ". . . very small in area and are restricted to small patches at the mouths of the larger rivers and estuaries. Experience has proved that careful search shows that some Sharp-tails can be found in every one of these situations." Just in such situations as these Norton (1897 and 1927) and I (Montagna, 1940) found them in well populated colonies.

Norton (1897) suggests that north of Scarborough, Maine, it was unlikely that one would find typical *caudacuta*, because the ". . . physical features of the coast are such as to suggest the improbability of the normal range extending beyond this town." This is correct, and the fact that I took a typical *caudacuta* as well as *subvirgata* at Popham Beach substantiates the belief that this is the area of intergradation.

Norton (1897) describing the thoroughly different nature of the habitat of *subvirgata* as contrasted with that of *caudacuta* in Maine, says: "North of Scarboro, beginning with Cape Elizabeth, its eastern boundary, the coast presents an uneven or hilly face of rocks indented with coves and bays, studded with dry ledgely islands. Between the hills are innumerable arms of the sea often extending as 'tide rivers' or fjords several miles inland, bordered by narrow swales rather than broad expanses of marsh." The marshes of Popham Beach are of that description. They are surrounded by jagged, spruce-clad hills so close to the marsh that as I stood in the middle of it I could hear Hermit Thrushes (*Hylocichla guttata*) and Olive-sided Flycatchers (*Nuttallornis borealis*) singing.

It is interesting to note in *subvirgata* a tendency to frequent brackish or even fresh-water marshes. In Maine, there is a gradual transition from the broad, strictly salt-water marshes in the western portion of the state to brackish ones as one progresses eastward. This is natural be-

cause to the east, the only marshes to be found are at the mouths of rivers. Farther north, in New Brunswick and Quebec these birds become even more fresh-water-loving and Dwight (1887) calls attention to this fact in his description of *subvirgata*. He says: "One accustomed to the salt marshes where *caudacuta* makes its home would never dream of finding its northern relative inhabiting fields where grass is knee deep, and where the Bobolink and Savannah Sparrow find it dry enough to make their nests. And yet, this is the character of the marshes along the Petitcodiac River," New Brunswick, "where I have found the birds in considerable numbers." The habitat that Dwight described is possibly not altogether typical, but certainly one does not find the other coastal races of this species in such places. Thus we see a gradual transition from birds inhabiting salt-water marshes in western Maine to those in freshwater habitat along the Petitcodiac River and Kamouraska on the St. Lawrence. There is little doubt that *subvirgata* represents the closest eastern relative of the James Bay birds (*altera*) recently described by Todd (1938). I am not well enough acquainted with the northern representatives of *subvirgata* to know how closely they resemble *altera*. If *subvirgata*, indeed, is the closest race to *altera* it would be interesting to know where the area of intergradation occurs. Since the northern *subvirgata* are found in fresh-water marshes, it is possible that some colonies may be nesting inland along the southern portion of the Labrador Peninsula. This area, which extends about 500 miles from James Bay to the mouth of the St. Lawrence River, is studded with lakes and rivers and suitable marshes may be quite abundant.

A. c. caudacuta.—While collecting Acadian Sharp-tailed Sparrows (*A. c. subvirgata*) at Popham Beach, Maine, I took a breeding female *caudacuta* in the midst of a well populated colony of the former race. (Montagna, 1940) The discovery is not very remarkable when one realizes that 35 miles to the southwest, at Scarborough, *caudacuta* nests regularly. Some of the specimens of *subvirgata* from Popham Beach are definite intermediates between the two races, although the majority of them prove to be good *subvirgata*. So, then, the area between the two localities mentioned above may be considered the area of intergradation. In Maine, *caudacuta* has been found nesting only at Scarborough, Wells, and Kittery. In these places the habitat is much different from that found north of Scarborough. The marshes become more wide and spacious as one proceeds southward. So, with the widening of the marshes the birds become more common and more generally distributed, and along the New Hampshire coast they are found in good numbers. Griscom says, "One of the curious things about the Sharp-tailed Sparrow that is striking in my own field experience with every described form is that as you proceed northward the bird tends to become local. In a good salt marsh on the south shore of Long Island, for instance, Sharp-tails are ubiquitous and abundant. By the time you reach the coast of

Massachusetts north of Boston, enormous areas of salt marsh like Plum Island meadows, between Ipswich, Rowley, and Newburyport, for no known reason the Sharp-tail is not ubiquitous. There will be a colony here and there along the bank of some tidal creek, when for all you can see, the Sharp-tails might just as well as not be up and down the entire length of the creek."

Their numbers increase as one proceeds southward to Rhode Island, Connecticut, and New York. Along the New York coast, including Long Island, the birds are extremely abundant, and it does not seem extravagant to consider this state, in spite of its limited coast line, as the center of abundance of these birds. Here one finds the "mean" of the species. By "mean" I wish to point out that specimens of nesting birds taken from this general area are very typically colored *caudacuta*, which are not as dark as the race to the south, *diversa*, not as pale as the adjacent race to the north, *subvirgata*, not as brightly colored as the inland race, *nelsoni*.

Along the New Jersey coast Sharp-tailed Sparrows are very common. Stone (1909) lists the birds as "Abundant summer resident on the salt meadows of the coast and Delaware Bay. . . ." In June, 1940, Jim Fife and I found them common along the coast of Ocean County. They were especially abundant at Tuckerton, in the southern part of Ocean County. Yet, although apparently suitable marshes were found on Long Beach and Island Beach, our searches there were fruitless. Just south of Tuckerton on the vast marshes on the promontory which projects between Little Egg Bay and Great Bay they were found only in scattered numbers and never very far from the drainage ditches near the water. From Tuckerton we took a fine series of specimens.

These proved to be of unusual interest because among typical *caudacuta* are several birds which are referable to the southern race, *diversa*. These are ". . . dark highly colored . . ." birds (Bishop, 1901a), comparable to the birds from farther south. Some of the birds in this series are undoubtedly intermediates between the two races. I have not seen birds from Delaware Bay but they are, probably, *diversa*.

Ammodramus caudacuta diversa.—Hellmayr (1938) defines the breeding range of this race as "in the salt marshes of the Atlantic Coast of the United States from Maryland to North Carolina."

In late June and July, 1941, Jim Fife, H. Gordon Stevenson, Jr., and I surveyed the coast of Delaware, Maryland, Virginia, and North Carolina for nesting Sharp-tails. In Delaware we found no birds until we reached Lewes. They were not common, however, and we did not collect any. They were more numerous at Rehoboth Beach and at Bethany Beach. Birds collected from these localities are definitely of the race *diversa*. We proceeded southward from Bethany Beach, stopping at constant intervals along the vast uninterrupted stretch of marsh of the eastern coast of the Delmarva Peninsula. Not until we arrived at Saint George's Landing in northern Maryland did we find any more birds.

This was a colony of several hundred birds. Other Sharp-tails were found farther south at Cornfield Harbor and Ocean City. We came across no other colonies in Maryland.

In Virginia we found a populous colony in the northern portion of the state, at Chincoteague Island. These marshes were vast and birds could be found nearly everywhere among them. The fine series collected at this point represents our southernmost specimens.

From Chincoteague we went southward to Cape Charles, at the tip of the peninsula and we visited *all* of the marshes along the way. From Cape Charles we went across to Norfolk, then to Cape Henry, Virginia Beach and Back Bay without finding any Sharp-tailed Sparrows. We went on to North Carolina along the Currituck Sound, investigating the endless expanses of marsh all along the way. We then proceeded to Roanoke Island, the type locality of *diversa* (Bishop, 1901b). Here, at least, we expected to find nesting birds. But the marshes around Wanchese, the type locality, were all coarse and brown, and the vegetation was either entirely submerged or too dry. The island is perhaps seven miles long, and during the three days that we remained there we searched its marshes thoroughly. There were no Sharp-tailed Sparrows to be found, nor were there any on Pea Island, a marshy island not far from Roanoke. We went on down as far as the mouth of the Neuse River at the south end of Pamlico Sound. All this was fruitless. I am now convinced that there are no breeding Sharp-tailed Sparrows in North Carolina.

Bishop (1901b) lists specimens taken on May 10 and May 11 from Roanoke Island. It has been concluded from this that these birds were breeding birds. Yet, it must be remembered that Sharp-tails are notorious laggards in their migratory movements. Bishop himself did not believe that the birds nested there, and in a recent letter he tells me that "Roanoke Island does not show country suitable for the breeding of this species . . . but Pea Island does . . .," "1901 . . . was, I think, my first visit to Pea Island. Subsequent visits I made there on spring dates failed to give me any later birds, and I finally concluded the race did not breed there, but further north. But I failed to find it on Charles Island, Virginia, the spring I was there. . ."

Investigation of the records of breeding Sharp-tails in Virginia convinces me that these birds are found only in the northern portion of that state, and that Chincoteague Island is either the southern or nearly the southern limit of breeding Sharp-tailed Sparrows. Rives (1889-1890) says of this bird in Virginia that it was a "rather common summer resident, and breeds at Cobb's Island." Yet, Dr. J. J. Murray tells me that they ". . . seem to be nonexistent or at least very rare on the Virginia coast except in the northern section." Dr. Murray goes on to tell me that Alexander Sprunt spent six weeks at Cobb's Island in the early summer of 1940 without finding any of these birds. In June 1941, Dr. A. A. Allen, William A. Wimsatt, and I searched the marshes of Hog

Island (adjacent to Cobb's Island), Rogue Island and Little Machipongo Island. No birds were found. H. H. Bailey (1913) calls attention to the fact that in Virginia these birds ". . . breed more abundantly along the salt marshes of the northwestern side of the Chesapeake Bay than on the Cape Charles Peninsula or coastal islands. . . ." Unfortunately, I have found no other references to the Chesapeake Bay region, and Mr. Bailey is very vague in his information. It is entirely possible, however, that appropriate marshes along the Bay harbor colonies of Sharp-tails.

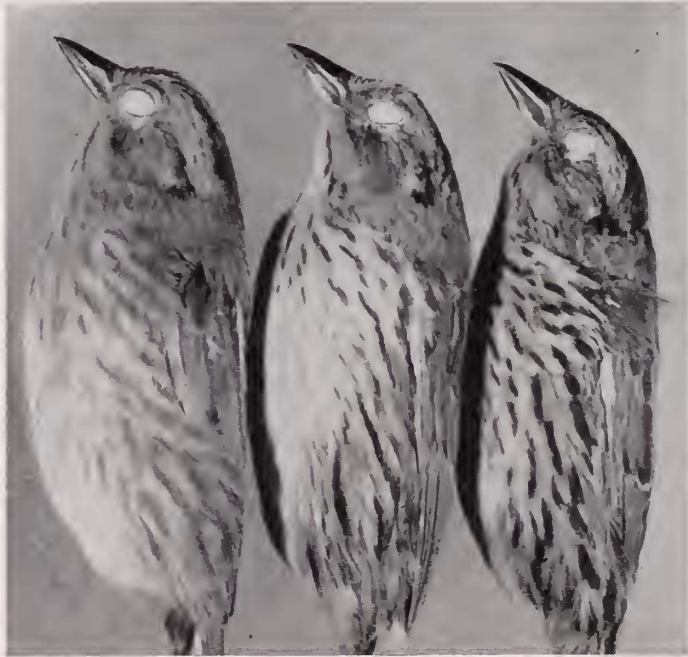


Figure 1. The three races of Sharp-tailed Sparrow that nest on the Atlantic coast. From left to right: *Ammospiza caudacuta subvirgata*, *caudacuta*, *diversa*. Note the increase in amount and sharpness of the streaking. (Photograph by Charles S. Brand.)

Ammospiza c. diversa, with its dark upper parts, is a well marked form. Realizing how really distinct the race is, one is rather surprised to find that it was not accepted by the A. O. U. Checklist, Fourth Edition. Oberholser (1931) defended the validity of this race, and I am sure that it will be generally accepted as it becomes better known.

HABITAT

The study of the type of habitat chosen by these birds is interesting. The general character of the marshes is more or less similar for all three of the races, whether in Maine or Maryland. These marshes are usually well drained, although they may be subjected to slight daily flooding by tides. The tidal water must not, however, come above the base of the grasses since these birds build their nests on the roots of the thick



Figure 2. Dorsal view of the specimens of Figure 1. Same sequence. (Photograph by Charles S. Brand.)

matings of grasses. The nests are suspended among the bases of the grasses only a few inches from the wet muck. To be sure, many of the nests are occasionally destroyed by sudden unusually high tides. Lewis (1920) in his study of the nesting of *subvirgata* in Nova Scotia makes interesting observations of the correlation of the height of spring tides and time of nesting. In closing he says "It would be interesting to know . . . if the birds, when nesting in salt marshes take into account the variation in the rise and fall of the tides. . ."

The Maine marshes, although they were restricted in area, offer an ideal condition for nesting. These were thoroughly and thickly covered by soft marsh grasses, the most common being *Spartina alterniflora*, *Spartina patens*, *Juncus Gerardi*, and *Triglochin maritima*. These marshes were flooded at high tide, but never did I find more than one or two inches of water where the birds were nesting.



Figure 3. Marsh near Popham Beach, at the mouth of the Kennebec River, Maine. This is typical habitat of the Acadian Sharp-tailed Sparrow. (Photograph by Ralph S. Palmer.)

The New Jersey marshes resembled those of the Maine coast. But the birds were nesting in slightly elevated "islands" scattered here and there along the immense marshland. These "islands" showed signs that they were occasionally slightly submerged, but they were comparatively dry, having a luxuriant growth of *Distichlis spicata*, and *Spartina patens*, whereas the surrounding muckier marshes had a sparser, coarser and taller vegetation with a predominance of *Scirpus* sp. and *Juncus Gerardi*. Yet, south of Tuckerton, along the drier marshes which extended miles in width no birds were found away from the shore. These marshes were possibly too dry. The birds preferred the slightly elevated "islands" toward the ocean side to all other habitats.

The marshes inhabited by Sharp-tails on the eastern side of the Delmarva Peninsula were well drained and green. The grasses were thick, soft, and seldom over a foot in height. At Chincoteague, Virginia, the habitat was most suitable and birds were very numerous.

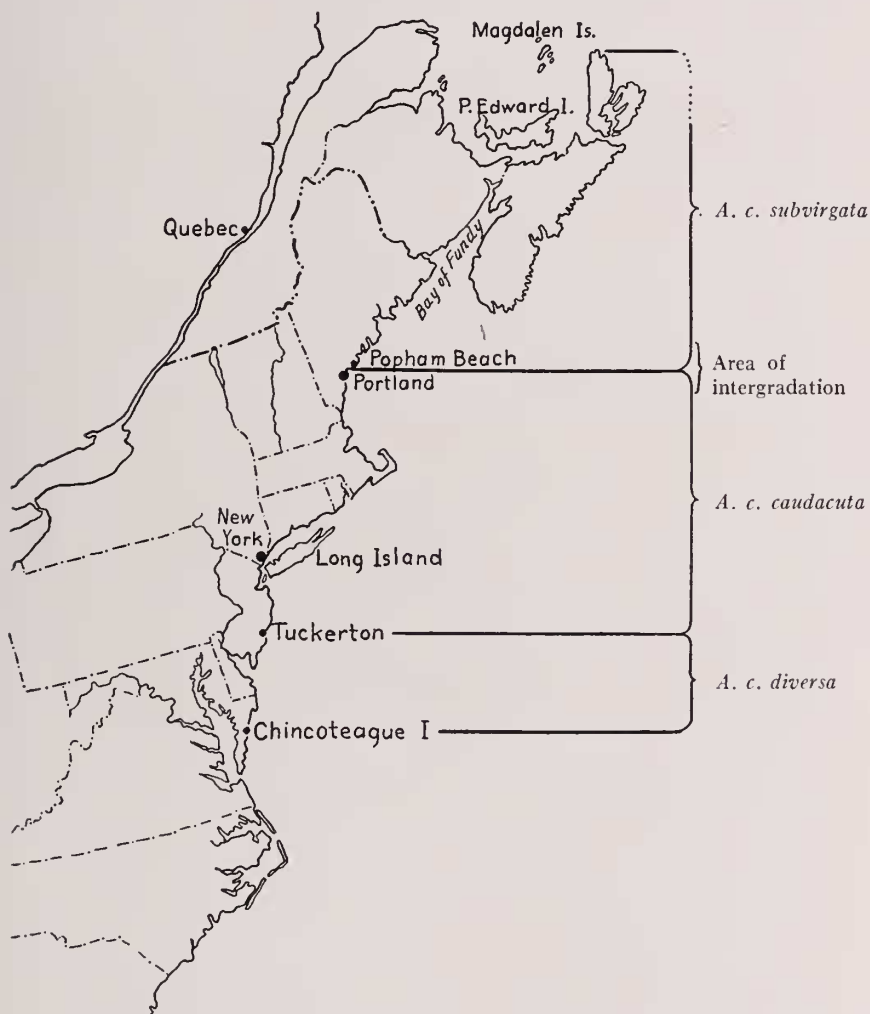


Figure 4. Map of the breeding ranges of the eastern Sharp-tailed Sparrows.

But again drainage alone did not seem to be the determining factor, for here and there were found large equally suitable areas devoid of birds. At Bethany Beach, Delaware, they were found along narrow strips

of marsh flanking the narrow tongues of sea which project inland. The birds were found only along the edge of the marsh toward the water or along the tidal pools close to the main bodies of water. These marshes were very restricted and became dry only fifty yards away, where elderberry (*Sambucus* sp.) was common. So, within 25 yards one found habitats suitable for Sharp-tails on the marshy side and Grasshopper Sparrows and Henslow's Sparrows on the dry land.

H. Godwin Stevenson, Jr. made the following list of the plant association found in marshes inhabited by Sharp-tails along the Delaware, Maryland, and Virginia coasts. *Distichlis spicata* (very abundant), *Spartina patens*, *Spartina glabra* (most abundant), *Scirpus americanus* and *S. robustus*, abundant.

It was evident that as one progressed southward the coastal marshes lost the meadowy appearance and became coarse, tall, and sparse. They were either submerged or entirely dried out. *Juncus Roemerianus*, a tall very coarse brown weed, was perhaps the predominant plant. Plants found dominant only where there were no Sharp-tails were *Salicornia europea* and *Eleocharis*.

BEHAVIOR OF BREEDING BIRDS

All of the three races of this species, with which I am familiar, are unusually quiet birds. With the exception of the "song" of the male, they utter short, retiring chips only infrequently. The Maine birds were the most frequent singers. A male bird would sing again and again; often within the area of one hundred square yards a dozen or more birds could be seen in the air, fluttering and descending, their song sounding like a gasp. In New York and New Jersey, however, the males were a little more quiet. I have watched these birds from the earliest hours of the morning to late evening, and only rarely could I see more than one bird in the air, and seldom could I hear more than three or four songs at one time, although male birds were all around me. The New Jersey birds had two distinct songs. One was the typical song of these birds, a hiss or gasp; the other resembled that of its close cousin, the Seaside Sparrow (*Ammospiza maritima*). The race *diversa* chirps more frequently than *subvirgata* and *caudacuta*. When they were feeding young they scolded occasionally at our intrusion and often, when we squeaked for them they chirped softly but repeatedly. Also, the occasional flight songs of *diversa* which I witnessed did not seem as spectacular as those of the other races to the north. The males rose only twenty or so feet in the air, uttering the song repeatedly, in the ascent as well as the descent. The song too, seemed to be harsher and more varied than that of *caudacuta* and *subvirgata*.

In Virginia when we flushed birds they often flew to a reed and began chipping softly. They were many times immediately assailed by

one or more birds which made their appearance from the grass. Together they often rolled to the ground in a tangled, fighting mass. There they remained fighting almost silently, often flapping, or perhaps chirping softly. In Maine, with *subvirgata*, I made observations somewhat like this. However, there I was able to confirm to my satisfaction that these were birds fighting over a female. With the southern birds there seemed to be a different story; twice I collected these "fighting" birds, none escaping, and they all proved to be males.

The diet of the southern Sharp-tails consists almost entirely of blackish spiders which are very abundant among the marsh grasses. The gizzards of birds collected were full of spiders and evidently the parent birds were feeding them to the young.

WINTER RANGE

One of the interesting things about Sharp-tails is that all of the races may be found wintering together along the coast of the southern states. The most notable locality for their congregation is Amelia Island, Florida, where not only the three Atlantic Coast birds are found, but also the other two races of this species, the western inland form, *nelsoni*, and the James Bay one, *altera*. Sharp-tails winter from Massachusetts south to Florida, North Carolina and South Carolina being their centers of abundance.

Ammospiza caudacuta nelsoni.—I have examined several specimens unmistakably of this race from the Gulf Coast and Florida, as well as some from South and North Carolina. One bird from Cobb's Island, Virginia, marks the northernmost wintering locality known to me. The specimen was examined carefully and compared with breeding specimens from Minnesota. Since I have only scanty data, and the many sight records in the literature are of no value, I shall not try to interpret the migratory movements of this race. It will suffice to say that *nelsoni* does occur on the Atlantic coast, perhaps in greater numbers than has been realized.

Ammospiza caudacuta altera.—It is almost certain that many of the east coast birds which for the past years have been called *nelsoni* are actually *altera*, which Todd (1938) described from James Bay. There has been some discussion as to the validity of this race, and since Mr. Todd was good enough to show me his entire James Bay series I want to say that on the basis of these birds, contrasted with specimens from Saskatchewan, the race seems perfectly acceptable. Examination of a large number of migrant birds from Amelia Island, Florida, and Pea Island, North Carolina, convinces me that this race deserves recognition. Our series of locally collected specimens at the Cornell University Museum is made up almost entirely of young birds of this race. Sharp-tails are reported in Ithaca, New York, nearly every year, from September 23 to October 28. I am sure that should closer search be made these birds

would be found in some numbers in autumn along the inland marshes south of the Great Lakes. These birds are practically never recorded inland during the spring migration, and secretive as they are, they are not easily seen even on the coast. Harry Hathaway tells me that he has observed them in large numbers along the Long Island and New York coasts for many springs.

That *altera* winters at Amelia Island, Florida, Mt. Pleasant, South Carolina, and Dare County, North Carolina is substantiated by specimens. Doubtless some may be found wintering all along the coast as far north as New York.

Ammospiza caudacuta subvirgata.—It may be assumed that *subvirgata* migrates southward in the fall primarily along the coast. For lack of other evidence we must accept this, although I am of the opinion that these birds, which, in their nesting habitats show a transition from salt to fresh-water marshes, do not altogether follow the coast. I also believe that if careful search were made they would be found along our inland marshes. Two specimens in our Cornell University collection, collected by Louis A. Fuertes at Ithaca, are of this race. Burch (1897) took a bird in Yates County, New York, which Dwight identified as *subvirgata*. The literature is full of inland sight records, which one may doubt, but Dwight's identification of the Yates County specimen was doubtless correct. Also, Wetmore and Lincoln (1932) took a specimen somewhat inland at Cornfield Harbor. The main wave of migration occurs along the coast, where wintering *subvirgata* have been found from New York to Florida. The preferred wintering quarters are South Carolina and Florida.

Ammospiza caudacuta caudacuta.—These birds are strictly marine and have never, to my knowledge been reported inland. They proceed southward along the coast, a few of them wintering all along the breeding grounds. They have been reported wintering from Massachusetts to Florida. Their numbers in the winter increase from Virginia southward, being particularly abundant in the Carolinas and Florida. In April, 1941, William A. Wimsatt and I found them in fair numbers at Hog Island and Rogue Island, Virginia.

Ammospiza caudacuta diversa.—Specimens of this race taken from North Carolina prove that they winter there in abundance. They have been taken also from South Carolina, Georgia, and Florida, as far south as Amelia Island. In April, 1941, Wimsatt and I found three in the marshes of Hog and Rogue Islands, Virginia; *caudacuta* was far more common.

RELATIONSHIP BETWEEN THE SHARP-TAIL AND SEASIDE SPARROWS

Since these species live side by side in the salt marshes there would seem to be a natural competition for survival. However, as one begins to understand the birds' preference for habitat one realizes that such

competition is largely avoided; perhaps the only real rivalry between them is in their search for food, both species feeding on small aquatic and semi-aquatic arthropods. It is in their choice of nesting sites and territory that the two birds differ most markedly. I have already discussed the nesting of the Sharp-tails. The Seaside Sparrows nearly always place their nests on tussocks of grasses which are usually growing from shallow water, the nests being a foot or so from the level of the water. The coarse, brown, flooded marshes of southern Virginia and the Carolinas are the ideal habitat of Seasides, which may be found there in great numbers.

Generally speaking, the behavior of the two birds is similar. In New Jersey I witnessed Seasides fluttering up into the air in the manner of the song-flight of the Sharp-tails. This behavior was observed again in North Carolina. It was not a true song-flight like that characteristic of the other species, but there is enough similarity to remind one of it.

I have often wondered about the more intimate relationships of these birds. They resemble each other in general appearance and in their habits. I had rather hoped that with extensive collecting I might some day take a bird which showed signs of intergradation between the two species. In June, 1940, at Tuckerton, New Jersey, I collected a male Sharp-tail and a female Seaside while they were in copula on a tussock of grass.

SUMMARY

The Acadian Sharp-tailed Sparrow, *Ammospiza caudacuta subvirgata*, is found nesting as far north as Kamouraska on the Gulf of St. Lawrence, and there are sight records even from the Magdalen Islands. This race breeds southward all along the coast to Popham Beach, Maine, where intermediates with *caudacuta* are found. *A. c. caudacuta* breeds from Portland, Maine, to southern New Jersey, becoming particularly abundant along the coast of New York, and especially Long Island. Tuckerton, New Jersey, is in the area of intergradation of this race with *diversa*. *A. c. diversa* breeds south of Tuckerton, New Jersey, in the marshes of the Delaware Peninsula, and along the coast of Delaware, Maryland, and northern Virginia, to Chincoteague Island. This is the southernmost known locality of their breeding distribution.

New York is without doubt the center of breeding abundance of this species. As one progresses northward and southward the birds become more local in their distribution.

All the five races of the species may be found wintering along the Atlantic Coast. Their wintering range extends from Massachusetts to Florida, North Carolina and South Carolina being the centers of abundance. *A. caudacuta nelsoni* has been found in the winter from Cobb Island, Virginia, to Florida; *altera* is found regularly from New York City to Amelia Island, Florida; *subvirgata* has also been reported in

New York, and south to Amelia Island, Florida. Typical *caudacuta* may winter all along its breeding range, south to Amelia Island. This race is often recorded from Massachusetts. *A. caudacuta diversa* winters south from Hog Island, Virginia, to Amelia Island, Florida.

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To the Editor of the Wilson Bulletin:

Now that fourteen of my Bulletins on the "Life Histories of North American Birds" have been published, your readers may be interested to know what progress is being made on future volumes.

The manuscript for the fifteenth, on the Corvidae and Paridae, has long since been completed and is in the hands of the publishers in Washington.

My work on the sixteenth, containing the birds on the 1931 Checklist from the nuthatches to the thrashers inclusive, is practically done, except for a few minor details.

I am now starting work on the seventeenth volume, which is planned to include the birds on the 1931 Check-list from the thrushes to the vireos inclusive.

It is planned to accumulate manuscript in advance of publication, which may be retarded under the present war conditions.

I wish to take this opportunity to thank all those who have contributed material for previous volumes, to remind them that this is a co-operative work, and to ask them to send me, as soon as possible, contributions of notes, data and photographs relating to birds to be included in the seventeenth volume; the sooner these are received, the easier it will be for me to use them.

140 High Street,
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Sincerely yours,
A. C. BENT

FLIGHT AND RUNNING SPEEDS OF BIRDS

BY CLARENCE COTTAM, CECIL S. WILLIAMS AND CLARENCE A. SOOTER

ONE of the chief characteristics and most fascinating accomplishments of birds is their remarkable degree of mobility. This quality undoubtedly has had high survival value in their evolution. Obviously, there is great variation among individuals of a species or even within the same flock or covey. As might also be expected, there is a vast difference between the normal cruising and feeding speed and the maximum speed; each of these probably varies under a wide range of conditions. In addition to the will for speed at any particular moment, wind direction and velocity, angle of flight in relation to the earth, the age and physical condition of the bird, the state of its plumage, and other factors modify the speed of the bird.

The topics of flight speed, altitude attained, and the mechanics or aeronautics of flight have already been the subject of considerable conjecture and observation. Specific data on flight and running speeds may prove of value to the investigator of predator-prey relationships. The subject of flight speed is best summarized by May Thacher Cooke in U. S. Department of Agriculture Circular No. 428, entitled "Flight Speed of Birds", issued in May, 1937. Relatively few running speeds have been recorded.

In the course of field work in various parts of the West, we have been able to time a number of birds whose flight or running speeds have never been recorded and to add to the rather limited data on record for others. All records were made by automobile, from which two or more observers usually checked the speeds. Our data are summarized in Tables 1 and 2. The bird names used are those of the A.O.U. Checklist (1931).